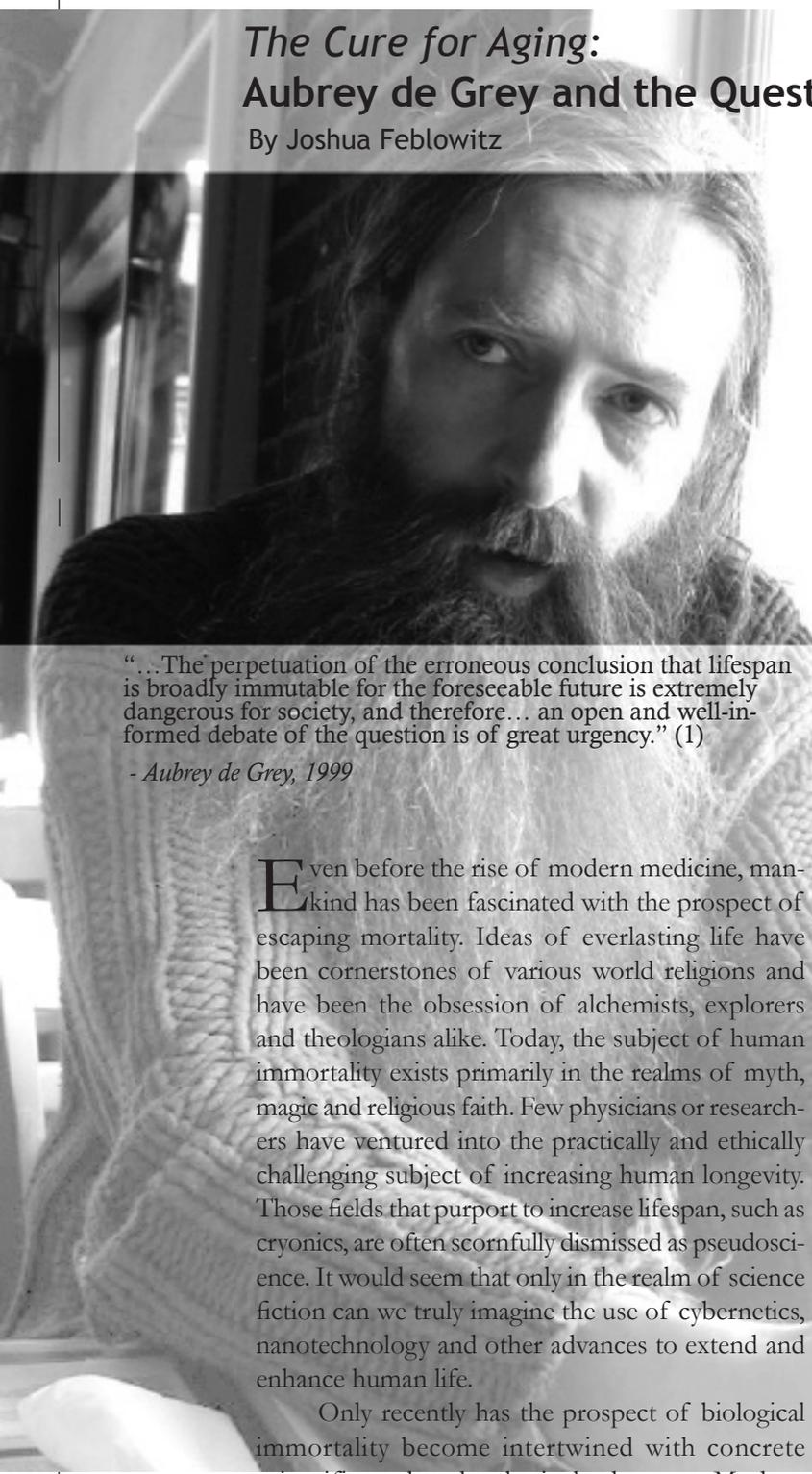


The Cure for Aging: Aubrey de Grey and the Quest for Biological Immortality

By Joshua Feblowitz



“...The perpetuation of the erroneous conclusion that lifespan is broadly immutable for the foreseeable future is extremely dangerous for society, and therefore... an open and well-informed debate of the question is of great urgency.” (1)

- Aubrey de Grey, 1999

Even before the rise of modern medicine, mankind has been fascinated with the prospect of escaping mortality. Ideas of everlasting life have been cornerstones of various world religions and have been the obsession of alchemists, explorers and theologians alike. Today, the subject of human immortality exists primarily in the realms of myth, magic and religious faith. Few physicians or researchers have ventured into the practically and ethically challenging subject of increasing human longevity. Those fields that purport to increase lifespan, such as cryonics, are often scornfully dismissed as pseudoscience. It would seem that only in the realm of science fiction can we truly imagine the use of cybernetics, nanotechnology and other advances to extend and enhance human life.

Only recently has the prospect of biological immortality become intertwined with concrete scientific and technological advances. Modern medical research on cancer, genetics and other health-related issues has allowed researchers to develop a more concrete understanding of the aging process. Studies of DNA mutations and other

genomic alterations have invigorated the scientific community and inspired new treatments for scores of different diseases. The mapping of the human genome and the advancement of stem cell research, for example, hold seemingly limitless possibility for medical advancement. Nonetheless, most scientists and physicians continue to view aging as a natural, inevitable and universal process.

Yet one theorist, Aubrey de Grey, has put forth a bold and complex theory in recent years on the possibility of dramatically extending the human lifespan. De Grey, at 45, is trained as a computer scientist and sports a mad-scientist beard that matches his extraordinary and radical theory on aging. De Grey is a self-taught member of the field of biogerontology—the science of aging—and began training himself in the natural sciences in 1995. Since then, he has published numerous articles in journals such as *Trends in Biotechnology* and *Annals of the New York Academy of Sciences* and is editor-in-chief of his own scientific journal, *Rejuvenation Today*. He has authored two books: *The Mitochondrial Theory of Aging*, a scientific treatise outlining his first major discovery in biogerontology, and *Ending Aging*, a veritable manifesto meant to outline his complete theory of aging and stimulate public dialog (2).

De Grey's theories, know collectively as *Strategies for Engineered Negligible Senescence (SENS)*, have provoked both skepticism and wonder while drawing the ire of theologians and scientists alike. Jason Pontin, editor-in-chief of MIT's *Technology Review* went so far as to call de Grey a “troll,” asserting that “when technology appropriates the transcendental, it becomes science fiction.” (3) It is true that de Grey's ideas seem, at first glance, to be fanciful in nature, but his seven strategies to “cure” aging stem from modern and relevant biological issues such as DNA mutations, cell senescence and the replication of mitochondria.

De Grey's comprehensive theory of aging is largely based on what he calls the mitochondrial free radical theory, which he first published on in

1999. The theory states that aging is caused primarily by the mutation of mitochondrial DNA due to free radicals that are produced in the mitochondria themselves (4). Mitochondria, which de Grey refers to as “cellular power plants,” provide energy to the cell by converting chemicals such as glucose into the “universal energy currency,” adenosine triphosphate (ATP). According to de Grey, these “power plants” produce free radicals, highly reactive molecules that can ultimately damage these organelles themselves via mitochondrial DNA. These damaged mitochondria eventually take over a small minority of cells that spread toxicity through the body, increasing oxidative stress (5). De Grey’s theory offers solutions to such damage that are derived from stem cell research and gene therapy.

Though based almost entirely on theory, de Grey’s ideas merit attention by virtue of their

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ingenuity and their implications. His ideas have yet to be extensively evaluated in a laboratory setting, and de Grey admits that a major breakthrough in biogerontology is still two or more decades away. Despite this, de Grey’s theoretical framework represents an extremely valuable contribution to modern scientific thought. His ideas have implications that are ethically and philosophically significant, and they also challenge scientists to take a completely new approach to the science of aging. In 2004, *Fortune* magazine characterized De Grey as “one of the boldest thinkers and organizers in the science of aging, whose ideas have begun to influence a whole generation of biologists.” (6) In addition, he has captured the attention of the public, appearing on news programs such as 60 Minutes and inspiring the 2007 documentary *Do You Want to Live Forever?*.

Just as important as the scientific basis of de Grey’s theories is the impact they have had in the scientific community, their ability to stimulate dis-

ussion by calling attention to the science of aging. In July of 2005, MIT’s Technology Review issued a challenge to the field of biogerontology, offering \$20,000 to any molecular biologist that could “submit an intellectually serious argument that SENS is so wrong that it is unworthy of learned debate.” (1) The Review cites a “puzzling silence” in response to de Grey’s theories that editors hoped to end with their SENS Challenge. Ultimately, a panel of appointed judges found that no one had successfully disproved the SENS theory; however, they also recognized the “highly speculative nature” of de Grey’s theoretical framework (7). The incredible controversy surrounding de Grey’s theories has thus promoted discourse and research in the field of biogerontology. Perhaps this is not de Grey’s primary goal, yet it is a vitally important outcome nonetheless.

Regardless of whether his theories are entirely sound, de Grey has stimulated our scientific imaginations. He has challenged the scientific world and the public to contemplate the possibility, the morality and the desirability of extending human life. Whether Aubrey de Grey is a genius or a madman, only time will tell. But de Grey deserves credit simply for posing this monumental question: Could we, and should we, live forever? **H**

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